REMARKS

In section 3 of the Office Action, the Examiner rejected claims 1-5, 17-22, 32-36, 44, and 45 under 35 U.S.C. §103(a) as being unpatentable over the Park patent in view of the Cahn patent.

The Park patent discloses a spread spectrum receiver in Figure 1 that receives a spread spectrum signal at an antenna 101. The signal is amplified by an amplifier 102, is passed through a band-pass filter 103, and is mixed by a mixer 104 with a carrier signal from a carrier generator 105 so as to remove the carrier from the received spread spectrum signal. Thereafter, the signal is passed through another band-pass filter 106. The output of the band-pass filter 106 is separated into an in-phase (I-channel) spread signal and a quadrature-phase (Q-channel) spread signal. The I-channel spread signal and the Q-channel spread signal are reduced to IF by mixers 110 and 112. The processing of the Q-channel spread signal is the same as the processing of the I-channel spread signal.

The I-channel spread signal is passed through a low-pass filter 113 and is converted into a digital signal by an A/D converter 114. The digital I-channel spread signal is correlated with PN early, PN punctual,

and PN late codes from a reference PN code generator 143 by correlators 115, 116, and 117. The outputs of the correlators 115, 116, and 117 are squared by squaring circuits 118, 119, and 120.

The early I-channel digital spread signal from the squaring circuit 118 and the early Q-channel digital spread signal from the squaring circuit 126 are added by an adder 129. The square root of the output signal from the adder 129 is formed by a square root circuit 132 and is provided as an early correlation-compensated signal.

The punctual I-channel digital spread signal from the squaring circuit 119 and the punctual Q-channel digital spread signal from the squaring circuit 127 are added by an adder 130. The square root of the output signal from the adder 130 is formed by a square root circuit 133 and is provided as a punctual correlation-compensated signal.

The late I-channel spread signal from the squaring circuit 120 and the late Q-channel spread signal from the squaring circuit 128 are added by an adder 131. The square root of the output signal from the adder 131 is formed by a square root circuit 134 and is provided as a late correlation-compensated signal compensated.

The punctual correlation-compensated signal is used for initial synchronization, and the early and late correlation-compensated signals are used for the synchronization tracking. Specifically, a comparator 135 compares the punctual correlation-compensated signal to a predetermined threshold so as to determine whether initial synchronization has been achieved. The clock controller 141 receives the signal from the comparator 135 and controls a clock generator 142 to generate a PN clock that is provided to a PN code generator 143 which generates the PN early, PN punctual, and PN late codes.

In order to perform synchronization tracking, an adder 137 adds the early correlation-compensated signal to the late correlation-compensated signal. The signal from the adder 137 represents an error signal reflecting a phase difference between the reference PN code and the received spread signal. This error signal is converted to an analog signal by a D/A converter 138, is filtered by a loop filter 139, and is applied to a voltage controlled oscillator 140. The voltage controlled oscillator 140 applies an oscillation frequency to the clock controller 141 for synchronization tracking.

When initial synchronization has been achieved, a demodulator 144 demodulates the punctual I-channel and Q-channel digital signals into baseband data, and latch 145 synchronizes the demodulated data with the data clock outputted from the clock generator 142.

The receiver of Figures 2A and 2B is similar.

The Cahn patent discloses in Figure 14 the detection of residual code phase errors resulting from multipath interference. Satellite signals are received by a GPS antenna 28 and are band pass filtered at 232. The signals are then correlated with early, punctual, and late PN codes by an early correlator 240, a punctual correlator 243, and a late correlator 246. The correlation results are applied to detectors 248 to evaluate the power of the correlation functions. The power of the early and late correlation functions are maintained equal by a code phase error system 250 which adjusts the code phase time offset to maintain this relationship.

Also, if the code phase error system 250 determines that the amplitude of the punctual correlation is less than twice the amplitude of the equal early and late correlations, then a multipath reinforcement interference lag error exists. On the other hand, if the

code phase error system 250 determines that the amplitude of the punctual correlation is greater than twice the amplitude of the early and late correlations, then a multipath cancellation interference lead error exists. Finally, if the code phase error system 250 determines that the amplitude of the punctual correlation is equal to twice the amplitude of the early and late correlations, then no multipath interference error exists.

These errors may be used to computationally refine the position determination without changing the tracking of the code phase. These errors may be used to control the offset of the early correlator 240 so that the prompt correlator 243 may be made to more accurately track the time of arrival of the direct path signal. These errors may be used to generate a separation control signal 280 which, in turn, may be used to control the separation of the early and late correlations as well as the symmetry around the prompt correlation to better track the actual time of arrival of the code. Further, these errors may be used by a multipath model 282 to cancel multipath signals.

Independent claim 1 - As recognized by the Examiner, the Park patent does not disclose a signal

distortion detector that determines differences between correlation measurements along a correlation curve in order to detect positioning system satellite signal distortions as required by independent claim 1.

Therefore, the Examiner applies the Cahn patent. However, the Cahn patent likewise does not disclose a signal distortion detector that determines differences between correlation measurements along a correlation curve in order to detect positioning system satellite signal distortions as required by independent claim 1.

That is, multipath is not signal distortion. Multipath is simply the signal being received over different paths. That multipath is not signal distortion as can be seen from independent claim 1. Independent claim 1 recites that differences (plural) between the correlation measurements along the correlation curve are determined in order to detect signal distortion. Both the Park patent and the Cahn patent determine only one difference, i.e., between the early and late distortion. The punctual correlation in both patents is not used to determined a correlation difference.

While one difference may be sufficient for synchronization as disclosed in the Park patent and the

Cahn patent, one difference is not sufficient to detect signal distortion.

Therefore, because only one difference is determined according to the Park patent and the Cahn patent, and because more than one difference is required to detect signal distortion, the combination of the Park patent and the Cahn patent does not teach the invention of independent claim 1.

For this reason, independent claim 1 is patentable over the Park patent in view of the Cahn patent.

Independent claim 17 - Contrary to the assertion of the Examiner, the Park patent does not determine a first difference between first and second correlation measurements and a second difference between second and third correlation measurements. The Park patent determines only one difference, i.e., between the early correlation and the late correlation. Similarly, the Cahn patent determines at most only one difference, i.e., between the early correlation and the late correlation.

Therefore, the Park patent and the Cahn cannot be combined so as to meet the limitation so independent claim 17.

For this reason, independent claim 17 is patentable over the Park patent in view of the Cahn patent.

Independent claim 32 - As should be clear from the discussion above, neither the Park patent nor the Cahn patent discloses forming three or more correlation measurements, determining a single value from the three or more correlation measurements, and comparing the single value to a threshold.

Both the Park patent and the Cahn patent disclose forming three correlations. However, neither patent discloses the determination of a single value from the three correlations and the comparison of the single value to a threshold.

Therefore, the Park patent and the Cahn cannot be combined so as to meet the limitation so independent claim 32.

For this reason, independent claim 32 is patentable over the Park patent in view of the Cahn patent.

Independent claim 44 - As should also be clear from the discussion above, neither the Park patent nor the Cahn patent discloses determining at least first and second differences between first and second pairs of

first, second, and third correlation measurements. Both patents disclose at most forming only one difference.

Therefore, the Park patent and the Cahn cannot be combined so as to meet the limitation so independent claim 44.

For this reason, independent claim 44 is patentable over the Park patent in view of the Cahn patent.

Dependent claims 3, 4, 20, 21, 34, and 35 recite that each of the correlation measurements represents a different time shift and that all of the different time shifts are either late time shifts or early time shifts. The Park patent and the Cahn patent disclose only one late time shift and only one early time shift. Therefore, neither the Park patent nor the Cahn patent discloses plural late time shifts or plural early time shifts as recited in dependent claims 3, 4, 20, 21, 34, and 35.

Therefore, the Park patent and the Cahn cannot be combined so as to meet the limitation so dependent claims 3, 4, 20, 21, 34, and 35.

For this reason, dependent claims 3, 4, 20, 21, 34, and 35 are patentable over the Park patent in view of the Cahn patent.

CONCLUSION

In view of the above, the claims of the present application are fully enabled. Accordingly, allowance of these claims and issuance of the present application are respectfully requested.

Respectfully submitted,

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